

Customer No.: 31561
Docket No.: 10232-US-PA
Application No.: 10/605,345

AMENDMENTS

To the Claims:

1. (Currently amended) A process for forming a plurality of bumps on a wafer with an active surface, wherein the wafer further includes a passivation layer, a polymer layer and a plurality of bonding pads over the active surface, and the bonding pads are exposed by a plurality of first openings in the passivation layer and the polymer layer, the process comprising the steps of:

 forming an adhesion layer over the active surface of the wafer covering the bonding pads and the polymer layer;

 forming a barrier layer on the adhesion layer;

 forming a wettable layer on the barrier layer;

 removing a portion of the wettable layer and a portion of the barrier layer such that the residual wettable layer and the residual barrier layer remain on the bonding pads;

 forming a patterned mask layer on the adhesion layer, wherein the mask layer has a plurality of second openings that at least exposes the wettable layer;

 performing a printing process to form a solder paste layer including solder powders and a flux inside the second openings by depositing solder paste into each second opening, wherein the flux contacts the adhesion layer but not contacts the polymer layer;

 performing a first reflow process to transform the solder paste layer inside each second opening into a bump while the adhesion layer still remains during performing the first reflow process;

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removing the patterned mask layer, wherein the polymer is protected by the adhesion layer during removing the patterned mask layer; and

removing the adhesion layer outside the residual wettable and the residual barrier layer.

2. (original) The process of claim 1, wherein after removing the adhesion layer outside the residual wettable layer and the residual barrier layer, the process further includes performing a second reflow process to treat the bumps.

3. (original) The process of claim 1, wherein the adhesion layer is made of a material selected from the group consisting of titanium and aluminum.

4. (original) The process of claim 1, wherein the step of removing the adhesion layer comprises using an etching solution for etching the adhesion layer.

5. (original) The process of claim 4, wherein the etching solution for removing the adhesion layer does not react with the bumps.

6. (original) The process of claim 1, wherein a material of the barrier layer comprises nickel-vanadium alloy.

7. (original) The process of claim 1, wherein a material of the wettable layer comprises copper.

8. (original) The process of claim 1, wherein the polymer layer is made of a material selected from the group consisting of benzocyclobutene (BCB) and polyimide (PI).

9. (original) The process of claim 1, wherein the bonding pads are made of a material selected from the group consisting of copper and aluminum.

10. (original) The process of claim 9, wherein the under-bump-metallurgy layer

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is an aluminum/nickel-vanadium alloy/copper composite layer when the bonding pads are made of aluminum.

11. (original) The process of claim 9, wherein the under-bump-metallurgy layer is a titanium/nickel-vanadium alloy/copper composite layer when the bonding pads are made of copper.

Claim 12. Cancelled.

13. (Currently amended) A process of fabricating bumps on an active surface of a wafer, comprising the steps of:

forming a first under-bump-metallurgy layer on the active surface of the wafer;

forming a second under-bump-metallurgy layer on the first under-bump-metallurgy layer;

removing a portion of the second under-bump-metallurgy layer;

forming a patterned mask layer over the first under-bump-metallurgy layer, wherein the mask layer has a plurality of openings that at least exposes the second under-bump-metallurgy layer;

performing a printing process to deposit a solder paste layer into the openings, wherein the solder paste layer is made of a mixture including solder powders and a flux;

performing a first reflow process to transform the solder paste layer inside the openings into bumps, wherein the first under-bump-metallurgy layer remains covering [[on]] over the active surface of the wafer while performing the first reflow process;

removing the first under-bump-metallurgy layer outside the residual second under-bump-metallurgy layer; and

performing a second reflow process to treat the bumps.

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14. (original) The process of claim 13, wherein the second under-bump-metallurgy layer at least comprises a wettable layer.

15. (original) The process of claim 14, wherein a material of the wettable layer comprises copper.

16. (original) The process of claim 14, wherein the step of forming a second under-bump-metallurgy layer on the first under-bump-metallurgy layer further includes the steps of:

forming a barrier layer on the first under-bump-metallurgy layer; and

forming the wettable layer on the barrier layer.

17. (original) The process of claim 16, wherein a material of the barrier layer includes nickel-vanadium alloy.

18. (original) The process of claim 13, wherein the first under-bump-metallurgy layer includes an adhesion layer.

19. (original) The process of claim 18, wherein the adhesion layer is made of a material selected from the group consisting of titanium and aluminum.

20. (original) The process of claim 19, wherein the step of removing the adhesion layer includes using an etching solution for removing the adhesion layer.

21. (previously presented) The process of claim 20, wherein the etching solution for removing the adhesion layer does not react with the bumps.

Claim 22. Cancelled.

23. (previously presented) The process of claim 13, wherein the wafer includes a polymer layer disposed over the active surface, and the first under-bump-metallurgy layer disposed on the polymer layer.